

GLOBAL AND INDOCHINA CLIMATE MODELLING

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Numerical experiments with the coupled climate models of general circulation will be carried out. It is supposed to perform statistical analysis of physical fields, derived from simulation. Comparing of these results with observational data and model calculations on various models is to be done. Investigation of the climate warming influence on the Pacific thermohaline circulation and regional climate in Indochina is to be performed. Investigation of the Pacific Ocean pollution influence on the climate and biosphere processes at Indochina and South China Sea is planning. We will obtain forecasts of global and regional dynamics of environmental and agricultural processes based on mathematical models of biogeochemical cycles and crop yields. It is expected to get predictions of global warming, based on different scenarios of anthropogenic-technogenic activity, including the limitations of the Kyoto Protocol and the post-Kyoto agreements, the various options of limited implementation of agreements, especially with the growth of energy production and carbon dioxide emissions increase in the countries of Indochina. Research is to be conducted on Indochina data, and especially on the developing Vietnam.

It is suggested to realize the next research plan agreed with foreign partners:

- Development of a coupled global model of the thermohaline ocean circulation and atmospheric general circulation model.
- Collecting and preparing data for numerical simulations to reproduce the climate sensitivity with Global climate model.
- Planning for the computational experiments, the research models to produce forecasts of the global dynamics processes, including global warming, based on different scenarios of anthropogenic- technogenic activity, including the Kyoto Protocol and the various options for its not full implementation, and the implementation of new post-Kyoto scenarios.
- Preparation of the biosphere and climate stability estimates based on the Kyoto Protocol scenarios.
- Investigation of the climate warming influence on the Pacific thermohaline circulation and the regional European climate.
- Investigation of the influence of ocean pollution on climate and biosphere processes.
- Development and implementation of joint models of climate and biogeochemical cycles for the interactive processes of CO₂ transport and exchange of ocean - atmosphere - terrestrial ecosystems.

During the project execution will be developed and implemented the new versions of the global climate models. Model ocean block is based on the spatial thermohaline (describing the circulation caused by the distribution of temperature and salinity) equations, with the addition in the horizontal momentum equations the linear friction term [1]. Temperature and salinity satisfy individual advection-diffusion equations. Procedure also takes into account the convective adjustment.

To describe the processes in the atmosphere is supposed to use one of the two models. The first is the atmospheric general circulation model [2]. The second is two-dimensional energy and humidity model. Prognostic variables in it are the atmosphere temperature and

specific humidity near the land surface. Dynamic equations in the model of sea ice are solved for its capacity and for the average ice thickness. This formulation of the problem will lead to possibility to carry out calculations about the time thousands of years, taking into account the evolution of deep ocean [3].

The climate warming influence on Pacific thermohaline circulation and Indochina regional climate, the impact of pollution on ocean climate and biosphere processes will be studied in models. Developed models are also expected to use for the ensemble of calculations for optimizing the parameters of the model and study the dependence of the results of the initial data [4]. It will be developed the atmosphere carbon dioxide transport model, using climate model results and the spatial model of the production process of terrestrial ecosystems in the seasonal regime.

It is supposed to conduct computational experiments, to obtain forecasts of the global dynamics processes, including global warming, based on different scenarios of anthropogenic-technogenic activity in Indochina and South China Sea, including the Kyoto Protocol and the various options for the lack of full implementation, execution new post-Kyoto scenarios. It is supposed to obtain estimates of the stability of the biosphere and climate scenarios based on the Kyoto Protocol [5].

References

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